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RANDOM NUMBER GENERATOR (RNG) ENTROPY DURING THE GATEWAY VOYAGE®

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After retiring from the army, F. Holmes "Skip" Atwater became research director at The Monroe Institute® in 1988. Since then he has published technical research on methods for expanding consciousness, authored the inspirational book Captain of My Ship, Master of My Soul, and assisted hundreds of individuals in experiencing and exploring expanded states of awareness. Working in the Bob Monroe Research Lab, he has explored the realms of his own consciousness and adopted a spiritual perspective on everyday life.

This paper presents the early results of a study of reduced quantum randomness associated with focused consciousness during the GATEWAY VOYAGE® residential program. Dean Radin, PhD, senior scientist at the Institute of Noetic Sciences, director emeritus of the Consciousness Research Laboratory at the University of Nevada at Las Vegas, and twice president of the Parapsychology Association, assisted in the design of this study and analyzed the data obtained. His assistance and support is gratefully acknowledged. Dr. Radin is the author of The Conscious Universe, a landmark work that challenges our most basic assumptions about reality.

Background

Numerous studies have shown what happens when experimental subjects are asked to focus their conscious intention on altering the progress of a random event. Interested readers can review the literature on psychokinesis to learn more. This random event, typically a game or visual/auditory stimulus, is regulated by an electronic truly random number generator (RNG), sometimes called a random event generator (REG), which produces random sequences approaching maximal entropy (disorder). Overall, these studies indicate that some individuals can apparently affect the randomness in such devices, thereby altering the output of the feedback provided during said game or visual/auditory stimulus. But what researchers observe in these experiments may not be the full measure of what's going on.

Studies are now being conducted using a global network of RNGs/REGs in an attempt to observe possible correlations between focused human consciousness and quantum randomness—a presumed state of subatomic entropy. During periods of “intense collective human activity or engagement,”¹ the randomness in such devices—traceable to quantum entropy itself—apparently coheres or synchronizes to a degree beyond what is expected by

chance. These variations in randomness, or periods of apparent coherence, are not readily explainable by known forms of physical interaction.

These worldwide studies are showing that RNGs designed for research and thoroughly tested for randomness apparently depart from random expectation—become more coherent—during newsworthy events of widespread interest, e.g., the terrorist attacks of September 11, 2001. While adequate explanations for these observations of reduced quantum randomness remain elusive, it is conceivable that the ability to influence coherence of quantum entropy might be an inherent quality of focused human consciousness.

It is important to emphasize the fact that in these ongoing worldwide studies the “intent” of the “subjects” (the general population) is not to alter feedback nor to affect an RNG/REG. Indeed, the public at large is not even aware of the continuously running electronic devices. So from an observational perspective rather than a “cause and effect” point of view, it appears that quantum randomness—the entropy within subatomic physics—might be directly related to some aspect of consciousness itself.

In a recent study of directed healing intent conducted at the Institute of Noetic Sciences, three RNGs were placed in proximity to a small group of subjects focusing their “healing energy” on a sample of normal brain cells. After the directed healing, an independent medical lab examined the blinded samples, and the “treated” cells were found to be profoundly altered in comparison to a control sample. An examination of the data from the RNGs revealed that quantum randomness declined—became more ordered—during the directed healing time period even though the subjects (the healers) had no overt intent to affect the RNGs.

Once again, it would appear that observed quantum randomness might be related to mental focus without regard to conscious intent. Perhaps the seeming coherence of quantum entropy—the appearance of synchronized subatomic behavior that is “supposed” to be random—is actually an inherent quality of focused human consciousness rather than an effect of one upon the other. Thus, this observed subatomic “effect” is not volitionally or consciously intended.

The Study

An underlying theme of the *GATEWAY VOYAGE* residential program is focused consciousness. The structure of the curriculum guides a group of participants through an evolving series of explorations into what are referred to as Focus levels. Acting as a group, the participants experience exercises in these various Focus levels, encouraged by verbal guidance and a proprietary sound technology called Hemi-Sync®.

To examine the possibility that collective focused states of consciousness experienced by *GATEWAY VOYAGE* program participants may coincide with periods of reduced quantum

randomness, three commercial RNGs designed for research purposes are monitored twenty-four hours a day for the entire six-day *GATEWAY VOYAGE* program. One device is placed in close proximity to a primary group meeting area, referred to as the conference room or "white-carpet room" in the Nancy Penn Center (NPC). Another device is placed in an adjacent building, David Francis Hall (DFH), a lecture hall used in the evenings for presentations and speakers. And a third device is placed in Bob Monroe's cabin at Roberts Mountain Retreat (RMR), a site more than a mile away from the program locale.

Each device is connected to a personal computer (PC) operating in the Windows 98 environment. Program trainers occasionally notate significant course dynamics (e.g., starting Focus 12 exercise, going to lunch, etc.) on the PC in NPC while the program is running. Data are temporarily stored on the computers' hard drives during the program and later transferred to CD for permanent storage and analysis. All three computers are time-synchronized once a day during the program.

Analysis

As data are produced, a standardized analysis protocol is being used to examine the output of the RNG to determine (1) whether there were any periods of nonrandom output in any of the RNGs;² (2) if these periods could be matched to events within the program based on the trainer notations and/or the published program schedule; (3) if there were any variations in the degree or duration of nonrandom output which may be interesting in relation to unscheduled programs; and (4) if there were any correlations between nonrandom output and the progressive nature of the program (i.e., Is day four characteristically different from day two?).

To date, five *GATEWAY VOYAGE* programs have been analyzed in this manner. When other programs are under way at the Institute during a *GATEWAY VOYAGE*, no data are taken. This procedure is followed to prevent confounding variables due to the possible effect of other programs on the RNGs. Following is a list of the dates and times the electronic RNG in NPC was started for each of the programs now on record. The three RNGs at the different recording sites were activated on Saturday morning before the arrival of the program participants.

Series 1: 04/26/03 11:33:41

Series 2: 05/17/03 09:55:23

Series 3: 07/12/03 11:25:26

Series 4: 01/17/04 11:55:33

Series 5: 02/21/04 11:08:22

All raw bits were recorded from each RNG. The data from each RNG were processed by taking the first 200 bits recorded at the beginning of each second and summing those bits into samples. The chance expected value of each sample was thus 100. Each sample was turned into a standard normal deviate as $z = (\text{value} - 100)/\text{square root } (.25 * 200)$, and then that z

value was squared. This zsquare value, one per second, is chi-squared distributed, and is a measure of variance of the output of the RNG.

The zsquares were then summed to form a chi-squared value with degrees of freedom equal to the number of values in the sum (thus forming a cumulative measure of variance). The resulting chi-squared value was converted back into a normalized score after each 60 seconds of data as $z_var = \sqrt{chisquare_sum * 2} - \sqrt{(df * 2 - 1)}$, where df is the number of degrees of freedom, or samples, and then plotted. This z_var score is thus a way of graphing cumulative changes in variance and is the “standard” method used for this sort of long-term field RNG test. Each of the test series ended up with a z score greater than the chance expected value of zero, and series 2 and 4 resulted in significantly higher scores.

“Days” in the following graphs refers to twenty-four hours of continuous recording, and not to the time of day. Since all recordings started around 11:00 a.m., one may think of each “day” as 11:00 a.m. one day to 11:00 a.m. the next day.

Preliminary Findings

Figure 1, below, is a combined preliminary result from the five series for the main RNG (labeled NPC in the graph), the DFH RNG, and the RMR RNG. From this perspective, it is clear that the NPC RNG progressively accumulated to ever-increasing levels of significance as the six-day test continued, whereas the other two RNGs did not. The RMR RNG ended up almost exactly at chance, and the DFH RNG ended up slightly below chance (meaning slightly constricted variance). A rising curve here, as seen in the NPC RNG, means that at the bit level there were too many sequences of 0s or 1s, which led to too many large individual z scores, which led in turn to too many large z-squared values. The fact that this trend continued throughout the test in the NPC RNG is consistent with the idea that group mental coherence—presumed to be evoked by participants in focused consciousness during the conduct of exercises using the sound technology called Hemi-Sync—persisted for a number of days. It reached significance around day four and continued on to odds against chance of about 300 to 1 by the end of the training week. (See Figure 2.)

Figure 1

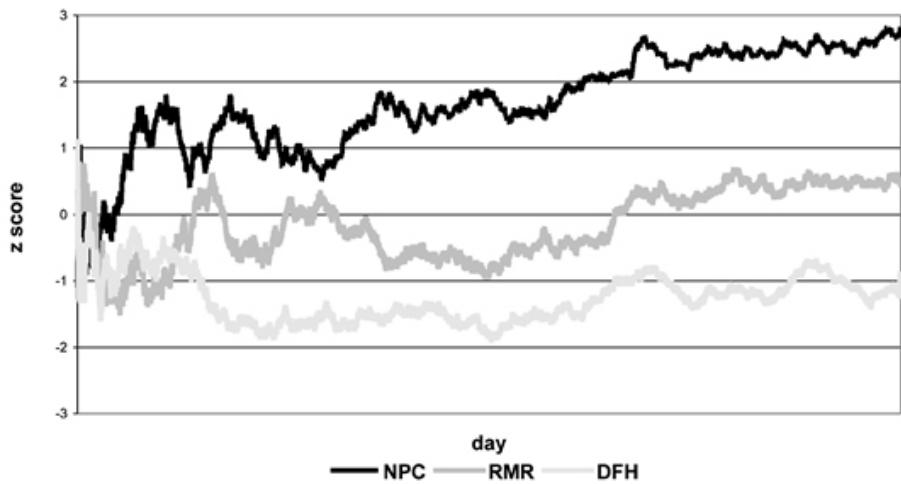
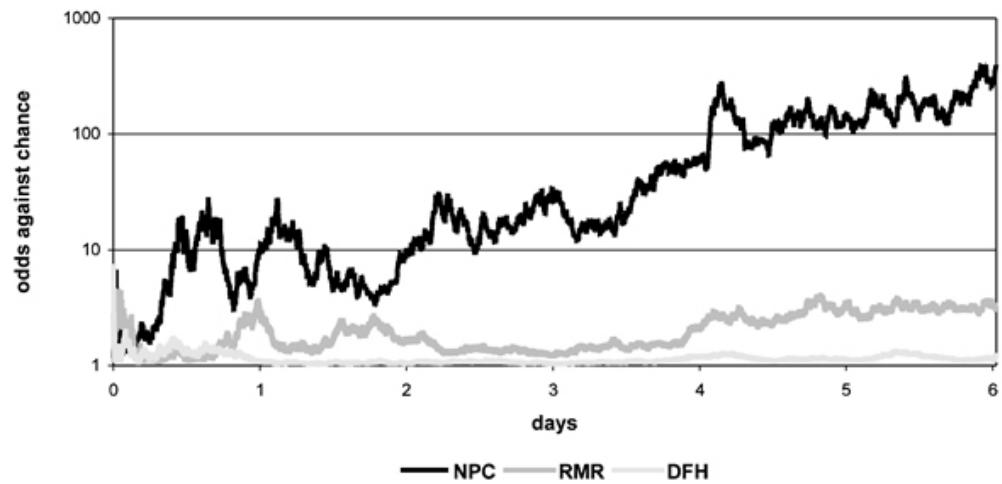


Figure 2, below, shows the same information as Figure 1 displayed in terms of (one-tailed) odds against chance.

Figure 2



Notice that in Figures 1 and 2 around day four there's a sudden upturn in the cumulative NPC graph. A cumulative graph holds an increasing amount of "inertia" from all previous data, so a sudden "bump" like this after four days of recordings is unexpected. A similar but smaller bump is observed in the RMR and DFH graphs as well. To examine this in more detail, see Figure 3. Instead of a cumulative plot, this shows the z score equivalent of a thirty-minute-long sliding window of chi-squared values. This allows us effectively to examine higher-frequency components of the RNG outputs. Figure 3 indicates, over the five-test series combined, that just after the beginning of the fourth day of recording (recall that each "day" starts at about 11:00 a.m.) there is a sharp and very unexpected increase in the NPC RNG variance. The

DFH and RMR RNGs do not appear to show much of interest, at least not to this degree, during the same time period.

Figure 3

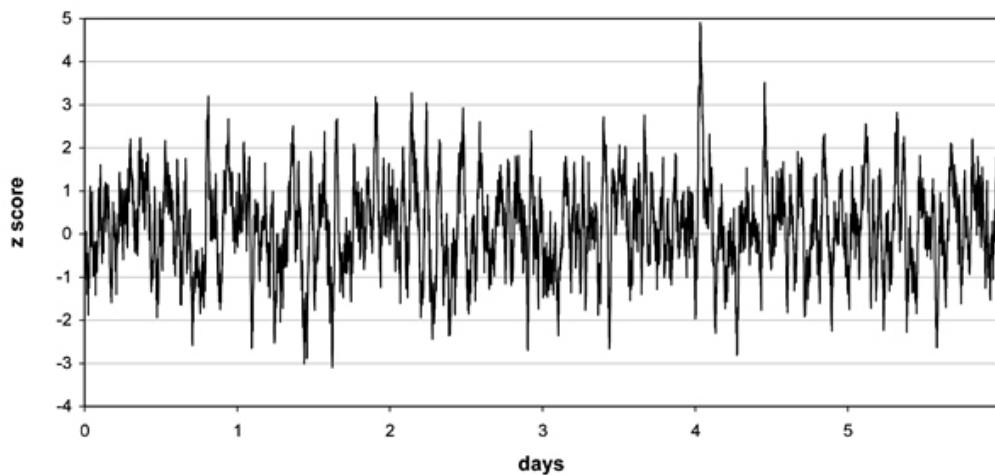
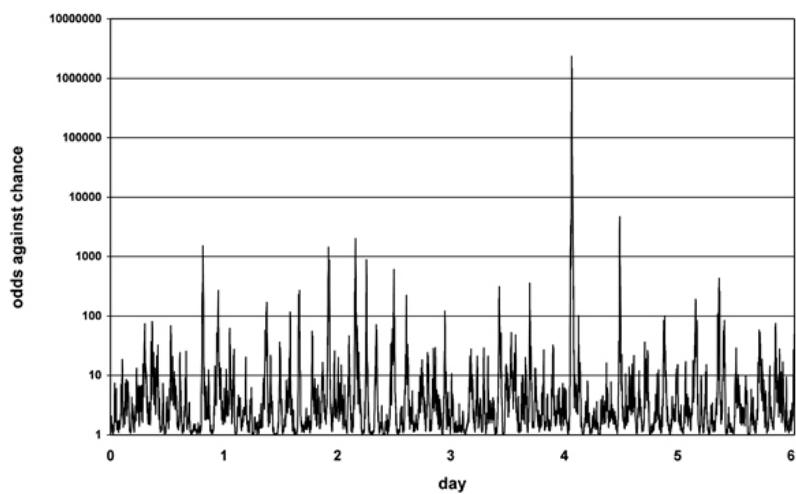


Figure 4 shows the same information as Figure 3 but in terms of odds against chance. It indicates, again within a preliminary look at this data, that the sharp rise peaked with odds of about 2 million to 1 against chance. Examination of the markings in the data records for the RNG in NPC indicates that at this time, in every series (except series 3, which only contained a few marks early on), this sharp rise occurred within thirty minutes of trainer notes indicating a Hemi-Sync® exercise called *Vibe Flow 15*.

Figure 4



Discussion

The *Vibe Flow 15* exercise warrants closer consideration, as it seems to have evoked a statistical effect beyond the small but persistent “coherence” created in the Nancy Penn Center during the *GATEWAY VOYAGE*. This may have something to do with the *Vibe Flow 15* exercise, but it may also be due to a kind of “kindling” or build-up effect that took four days to percolate.

Vibe Flow 15 is the third Hemi-Sync exercise on the morning of the fourth day. Interestingly, that morning is organized as a “silent morning” during which participants remain silent unto themselves without the usual group verbal sharing of their voyages through consciousness. Is the coherence of quantum entropy on the morning of day four associated with a kindling effect, the silent morning, the power of the *Vibe Flow 15* exercise, or . . . ?

There were several other preliminary findings of interest: The first event (with odds $> 1,000$ to 1) occurred on the morning of the first full day, roughly when the *Cable Car* wake-up music was playing. A second event looked like it was associated with *Intro to Focus 12*. A third event was associated with reconvening for the first full day afternoon session. We have already mentioned the fourth event, the *Vibe Flow 15* effect on the fourth day. A fifth event, with odds of almost 5,000 to 1, was associated in some way with the notation *Super Sleep* on the same day as the big *Vibe Flow 15* effect.

Note that precise time-event correlations are not easy to establish because the data markings on the different records are not uniform. Associations are somewhat clearer when two or more records show the same events within a few minutes of the peak statistical effect. The only two events showing this level of clarity were the *Vibe Flow 15* and *Super Sleep*. There is also evidence for a possible diurnal effect in the NPC RNG results, suggesting that while people are awake during the day and in focused consciousness during the conduct of exercises using the Hemi-Sync technology, there are intriguing deviations. When they are sleeping at night, these same deviations decline.

Conclusion

In quantum physics the oversimplified concept of physical matter—atoms with protons, electrons, etc., existing as tiny building blocks—has been left behind and replaced by the concept of physical matter as composed of quanta of energy with “tendencies” to exist. What we consider to be subatomic randomness is fundamental to this understanding. To quote Sir James Jeans, a prominent twentieth-century physicist, “The more we learn about the nature of the physical universe, the less it looks like a great machine and the more it looks like a great thought.”

It would appear from the preliminary observations of this study that collective Hemi-Sync-focused states of consciousness experienced by *GATEWAY VOYAGE* program participants may coincide with periods of reduced quantum randomness, an unusual coherence in an otherwise probable realm of subatomic quanta. The program participants were not aware of the continuously running electronic randomness-monitoring devices. Perhaps the observed coherence of quantum randomness could be an inherent quality of focused human consciousness itself and focused consciousness a key to understanding that we are more than our physical bodies. As Robert A. Monroe said: "Focused consciousness contains all solutions to the questions of human existence. Greater understanding of such consciousness can be achieved only through interdisciplinary approaches and coordinated research efforts."

References

1. R. D. Nelson, D. I. Radin, R. Shoup, and P. A. Bancel, "Correlations of continuous random data with major world events," *Foundations of Physics Letters* 15, no. 6 (December 2002).
2. There is the possibility that the "collapse of entropy" effect in RNGs is localized. If this is true, the farther the RNG is away from the participants in the program, the smaller the observed effects may be.

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